

CLAIMS

What is claimed is:

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1. A method of making an elastomeric formulation comprising the steps of:

combining a base polymer comprising carboxylate groups with:

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(a) carboxylic acid or a derivative thereof;

(b) a divalent or trivalent metal;

(c) an amine or amino compound; and

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(d) a neutralizing agent to neutralize at least a portion of the carboxylate groups in the base polymer;

wherein an accelerator, thiuram or carbamate is not used, and wherein the carboxylic acid or derivative thereof provides a level of carboxyl groups to crosslink with the base polymer and complex with the divalent or trivalent metal.

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2. The method of claim 1, wherein the base polymer is selected from natural latex, acrylonitrile, butadiene rubber, neoprene, isoprene, polychloroprene, and copolymers, blends and mixtures thereof.

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3. The method of Claim 1, wherein the base polymer is acrylonitrile.

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4. The method of Claim 1, wherein the carboxylic acid is selected from oxalic acid, adipic acid, citric acid, malic acid, glutaric acid, pimelic acid, tartaric acid, succinic acid, malonic acid, maleic acid, fumaric acid, orthophthalic acid, isophthalic acid, terephthalic acid,

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5. The method of Claim 1, wherein the carboxylic acid derivative is selected from ethylene acrylic acid copolymer, poly(acrylic acid), poly(methacrylic acid) and copolymers, blends and mixtures thereof.

6. The method of Claim 1, wherein the carboxylic acid derivative is ethylene acrylic acid copolymer.

5 7. The method of Claim 1, wherein the concentration of the carboxylic acid or carboxylic acid derivative is from about 0.1 to about 10 parts based on total dry weight of the base polymer.

10 8. The method of Claim 1, wherein the divalent or trivalent metal ion is selected from zinc, titanium, aluminum, manganese, copper, nickel, and mixtures thereof.

15 9. The method of Claim 1, wherein the divalent or trivalent metal ion is obtained from zinc oxide, zinc ammonium carbonate, titanium dioxide, aluminum oxide, manganese oxide, and mixtures thereof.

20 10. The method of Claim 1, wherein the metal ion is obtained from zinc oxide.

11. The method of Claim 1, wherein the concentration of the divalent or trivalent metal is from about 0.1 to about 5 parts based on total dry weight of the base polymer.

25 12. The method of Claim 1, wherein the amine or amino compound is selected from an aliphatic primary amine, an alkanoamine, and mixtures thereof.

30 13. The method of Claim 1, wherein the amine or amino compound is ammonium hydroxide.

35 14. The method of Claim 1, wherein the amine or amino compound is used to adjust the pH of the elastomeric formulation to from about 8 to about 10.

15. The method of Claim 1, wherein the neutralizing agent is selected from potassium hydroxide, sodium hydroxide, lithium hydroxide, ammonium hydroxide, and mixtures thereof.

16. The method of Claim 1, wherein the neutralizing agent is potassium hydroxide.

5 17. The method of Claim 1, wherein the concentration of the neutralizing agent is from about 0.1 to about 1.0 based on total dry weight of the base polymer.

10 18. The method of Claim 1, further comprising the step of combining an additional material selected from processing agents, pH control agents, curing agents, coagulants, colorants and fillers.

15 19. The method of Claim 18, wherein the elastomeric material is formed into a latex article.

20 20. The method of Claim 19, wherein the article is formed by straight dipping, coagulant dipping, casting or coating.

21. The method of Claim 20, further comprising drying the article at a temperature from about 140° F to about 250° F.

25 22. The method of Claim 20, further comprising drying the article at a temperature from about 160° F to about 200° F.

30 23. The method of Claim 19, wherein the article is a glove.

24. A glove comprising the elastomeric material of Claim 1.

25. A method of making a latex article comprising the steps of:

forming a latex formulation by combining 100 dry parts by weight of a base polymer comprising carboxylate groups with:

(a) about 0.1 to about 10 parts by weight carboxylic acid or derivatives thereof;

(b) about 0.1 to about 5 parts by weight divalent or trivalent metal;

(c) an amount of an amine or amino compound sufficient to adjust the pH of the latex formulation to between about 8 and 10; and

(d) about 0.1 to about 1.0 parts by weight neutralizing agent;

wherein an accelerator, thiuram, or carbamate are not used.

26. A method of making a latex article comprising the steps of:

forming a latex formulation by combining with 100 dry parts by weight acrylonitrile with:

(a) about 0.2 to about 8 parts by weight ethylene acrylic acid;

(b) about 0.3 to about 2 parts by weight zinc oxide;

(c) an amount of ammonium hydroxide sufficient to adjust the pH of the latex formulation to between about 8 and 10; and

(d) about 0.2 to about 0.7 part by weight potassium hydroxide;

wherein an accelerator, thiuram or carbamate are not used.

27. An elastomeric material comprising:
a base polymer having carboxylate groups;
a carboxylic acid or a derivative thereof;
a divalent or trivalent metal;
an amine or amino compound; and
a neutralizing agent to neutralize at least a
portion of the carboxylate groups in the base polymer;
wherein the carboxylic acid or derivative
thereof provides a level of carboxyl groups sufficient to crosslink
with the base polymer and to complex with the divalent or trivalent
metal, and wherein the elastomeric material does not comprise an
accelerator, thiuram or carbamate.

28. The elastomeric material of Claim 27, wherein
the elastomeric material has a tensile strength from about 1800 psi
to about 4000 psi.

29. The elastomeric material of Claim 27, wherein
the elastomeric material has a tensile strength from about 2000 psi
to about 2500 psi.

30. The elastomeric material of Claim 27, wherein
the elastomeric material has a 500% modulus from about 350 psi to
about 2000 psi.

31. The elastomeric material of Claim 27, wherein
the elastomeric material has a 500% modulus from about 400 psi to
about 800 psi.

32. The elastomeric material of Claim 27, wherein
the elastomeric material has an elongation from about 500 psi to
about 800 psi.

33. The elastomeric material of Claim 27, wherein
the elastomeric material has an elongation from about 600 psi to
about 700 psi.

34. A latex article comprising the elastomeric
material of Claim 27.

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~~35~~³⁴ 34. The latex article of Claim ~~33~~³⁴, wherein the article is a glove.

5 ~~36~~³⁵ 35. A formulation comprising :
 100 dry parts by weight of a base polymer
 comprising carboxylate groups;
 about 0.1 to about 10 parts carboxylic acid or
 derivatives thereof;
10 about 0.1 to about 5 parts divalent or trivalent
 metal;
 an amount of an amine or amino compound
 sufficient to adjust the pH of the latex formulation to between
 about 8 and 10; and
15 about 0.1 to about 1.0 parts neutralizing agent;
 wherein an accelerator, thiuram, or carbamate
 are not present.

20 ~~37~~³⁶ 36. A formulation comprising :
 100 dry parts by weight acrylonitrile;
 about 0.2 to about 8 parts by weight ethylene
 acrylic acid;
 about 0.3 to about 2 parts by weight zinc oxide;
 an amount of ammonium hydroxide sufficient
25 to adjust the pH of the latex formulation to between about 8 and
 10; and
 0.2 to about 0.7 part potassium hydroxide;
 wherein an accelerator, thiuram or carbamate
 are not present.

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